K.V.R G.V.R

PHYSICAL SCIENCE

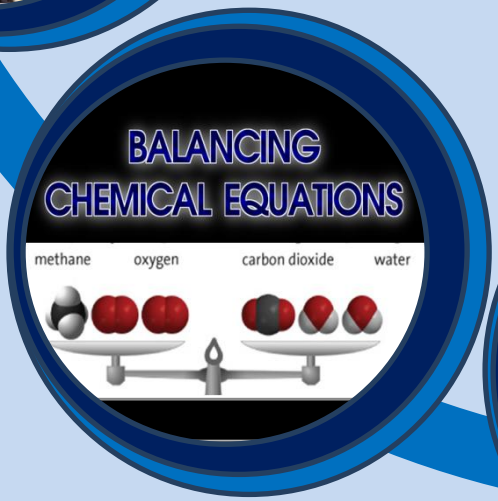
VICTOR'S MATERIAL

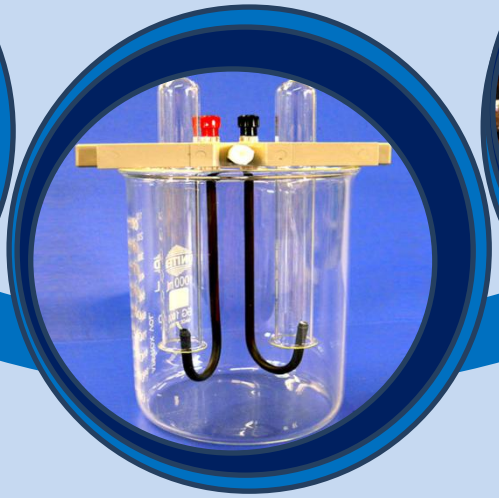
(Way to get good marks)

CLASS X - 2024-25

Prepared as per the SCERT Model Paper and Blue Print

K.V.Ramana & G.V.Ramaprasad





Physical Science 4 ever
Physical Science Made Easy
PhysicalScience4ever.com

Victor's Material is prepared according to the SCERT suggested Questions given in the form of Question Number wise Questions and Answers as per the Question Paper for better and easy learning. Dear students prepare well and get good marks in your exams.

1 MARK QUESTIONS

QUESTION NO.1

1. Predict and write why exhalation air is hotter than inhalation air in the respiration process.

Ans: Respiration is an ***exothermic process*** because energy is produced during this process.

2. Why do we apply paint on iron articles?

Ans: We apply paint on iron articles to ***prevent rusting*** by creating a protective layer that blocks moisture and oxygen.

3. Why do we keep food in air tight containers?

Ans: When food items are left exposed to air, they react with oxygen and become rancid, As a result taste and smell of the food change which is harmful to health. Thus, food items should be stored in air tight closed containers ***to avoid rancidity.***

4. "Formation of water by the combination of hydrogen and oxygen in one type of chemical reaction" – Frame any one question on this statement.

Ans: What type of chemical reaction occurs when hydrogen and oxygen combine to form water?

5. Why does the colour of copper sulphate solution change when an iron nail is dipped in it?

Ans: When an iron nail is dipped in the copper sulphate solution, iron displaces copper from the copper sulphate because iron is more reactive than copper.

Therefore, the colour of the copper sulphate solution changes.

The reaction is $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

6. Why respiration is considered an exothermic reaction? Explain.

Ans: Respiration is considered an exothermic process because during respiration glucose combines with oxygen in the cells of our body to form carbon dioxide and water along with the ***production of heat energy***.

$$C_6H_{12}O_6\ (aq) + O_2\ (g) \longrightarrow 6CO_2\ (g) + 6H_2O\ (\mathbf{l}) + \text{Heat Energy}$$

7. What happens when iron nail is exposed to moisture and water?

Ans: When an iron nail is exposed to moisture and water, it reacts with oxygen to form iron oxide, leading to the ***formation of rust***.

8. Pose any one question on classification of chemical reactions.

Ans: How are chemical reactions classified based on the nature of reactants and products?

9. Pose any one question to understand rancidity.

Ans: What causes rancidity, and how can it be prevented?

10. Pose any one question about the corrosion.

Ans: What are the factors that contribute to the corrosion of metals?

11. Oils and fat containing food items are flushed with nitrogen. Why?

Ans: Oils and fat-containing food items are flushed with nitrogen ***to prevent rancidity*** by displacing oxygen and slowing down the oxidation process.

12. Why hydrogen peroxide is kept in coloured bottle?

Ans: Hydrogen peroxide is kept in colored bottles to protect it from decomposition caused by exposure to light.

13. Why should a magnesium ribbon be cleaned before burning in air?

Ans: A magnesium ribbon is cleaned before burning to remove the oxide layer on its surface, ensuring it burns more easily and completely.

QUESTION NO.2

1. ..... gas is released on the reaction of zinc granules with dilute sulphuric acid.

Ans: Hydrogen

2. ..... gas evolves, when metal carbonate or metal hydrogen carbonate react with acids.

Ans: Carbon dioxide

3. Bases which are soluble in water are called.....

Ans: Alkalis

4. Complete the following equation. **Acid + Base $\longrightarrow$ Salt + ...**

Ans: Water

5. What is pH scale?

Ans: pH is a scale used to measure the acidity or basicity of a solution based on the concentration of hydrogen ions (H^+).

6. Write the formula of bleaching powder.

Ans: $CaOCl_2$

7. What is a neutralization reaction?

Ans: A neutralization reaction is a chemical reaction in which an acid reacts with a base to form salt and water.

8. What is the common name of the compound $CaOCl_2$?

Ans: Bleaching powder.

9. A solution turns red litmus blue, its pH is likely to be

(a)1 (b) 4 (c) 5 (d) 10

Ans: d) 10

10. Write the formula of Plaster of Paris.

Ans: $CaSO_4.½H_2O$

11. Which one of the following types of medicines is used for treating indigestion?

(a) Antibiotic (b) Analgesic (c) Antacid (d) Anteseptic

Ans: c) Antacid

12. The pH of a neutral solution is ……

Ans: 7

13. The process of mixing an acid or base with water is called……..

Ans: dilution

14. The nature of Magnesium hydroxide is ……..

Ans: Basic

QUESTION NO.3

15.

Solution	A	B	C	D	E
pH value	4	1	12	7	9

Which is the strongest alkaline solution among the solutions given in the table?

Ans: Solutoin C

16.

Solution	A	B	C	D	E
pH value	4	1	12	7	9

Which is the strongest acidic solution among the solutions given in the table?

Ans: Soluton B

17.

Substance	Blue litmus	Red litmus
X	Blue colour turns to red	Remains same
Y	Remains same	Remains same
Z	Remains same	Red colour turns to blue

Which is neutral?

Ans: Substance Y

18.

Solution	Gastric juice	Lemon juice	Pure water	Milk of magnesia	Sodium hydroxide
pH value	1	2	7	10	14

Which is used as antacid?

Ans: Milk of magnesia

19. Which sample solution is acid?

Sample solution	P	Q	R
Reaction with methyl orange solution	Yellow	Blue	Red

Ans: Solution R

20. Which is used to make drinking water free from germs

Substance	A	B
Formula	$CaOCl_2$	Na_2CO_3

Ans: Substance A

21. Which substance is used by doctors for supporting fractured bones in the right position

Substance	X	Y
Formula	$CaSO_4.2H_2O$	$CaSO_4.½\ H_2O$

Ans: Substance Y - $CaSO_4.½\ H_2O$

QUESTION NO.4

1. Write any one physical property of metals.

Ans: Ductility, Sonarity, Malleability

2. Write any one way or method to prevent the rusting of iron.

Ans: Applying a coat of paint

3. What are amphoteric oxides?

Ans: Amphoteric oxides are oxides that can react with both acids and bases to form salt and water.

4. What type of oxides are formed when non-metals combine with oxygen?

Ans: Non-metals combine with oxygen to form acidic oxides.

5. Which metals do not corrode easily?

Ans: Metals like gold and platinum do not corrode easily.

6. Name the alloy of copper and zinc.

Ans: The alloy of copper and zinc is brass.

7. Name the alloy of iron and carbon

Ans: The alloy of iron and carbon is steel.

8. Give an example of a metal which is liquid at room temperature.

Ans: A metal liquid at room temperature is mercury.

9. Give an example of a metal which can be easily cut with knife.

Ans: A metal easily cut with a knife is sodium.

10. What is meant by ductility?

Ans: Ductility is the property of a material to be drawn into thin wires.

11. Write any one general property of ionic compounds.

Ans: Ionic compounds have high melting and boiling points.

12. Give one example of amphoteric oxide.

Ans: An example of an amphoteric oxide is aluminium oxide (Al_2O_3).

QUESTION NO.5

1. Write any one use of carbon compound

Ans: One use of carbon compounds is fuel, such as in coal or natural gas.

2. Write any one industrial application of hydrogenation.

Ans: Making margarine from vegetable oil.

3. Write any one use of ethanoic acid/acetic acid.

Ans: Ethanoic acid is used as a preservative in pickles.

4. Write any one use of detergent

Ans: Detergents are used for cleaning clothes and utensils.

5. Write any one use of methane.

Ans: Methane is used as a fuel in homes and industries.

6. Write any one use of Vinegar.

Ans: Vinegar is used as a food preservative and flavoring agent**.**

7. Write any one use of saponification.

Ans: Saponification is used for making soap.

QUESTION NO.6

1. The least distance of distinct vision for an healthy young adult is

(a) 25m **b) 2.5 cm** **c) 25cm** **d) 2.5 m**

Ans: (c) 25 cm

2. The human eye forms the image of an object at its.

a) cornea **b)iris** **c) pupil** **d) retina**

Ans: (d) Retina

3. The changes in focal langth of an eye lens is caused by the action of the

a) pupil **b) retina** **c) ciliary muscles** **d) iris**

Ans: (c) Ciliary muscles

4. the human eye can focus on objects at different distances by adjusting the focal length of the eye lens. This is due to

a) presbyopia **b) accommodation**

c) near-sightedness **d) far-sightedness**

Ans: (b) Accommodation

5. Vyshnavi cannot read the newspaper clearly. What type of eye defect she has?

Ans: Vyshnavi has hypermetropia (far-sightedness).

6. What is the other name of near sightedness?

Ans: The other name for near-sightedness is myopia.

7. What is the other name of far sightedness?

Ans: The other name for far-sightedness is hypermetropia.

8. A back bench student in the classroom cannot see the black board clearly. What type of eye defect he has? (Or)
Srinadh can see near objects clearly but cannot see objects at distant. What type of eye defect is he suffering? (Or)
Sridhar has a difficulty in reading the black board while sitting in the last row. What could be the defect the child is suffering from?

Ans: The student has myopia (near-sightedness).

9. Define accommodation of lens.

Ans: Accommodation of the lens is the ability of the eye to adjust its focal length to focus on objects at different distances.

10. What is meant by cataract?

Ans: Cataract is the clouding of the eye lens, leading to decreased vision. It is caused by protein buildup in the lens

11. Define Dispersion of light.

Ans: Dispersion of light is the phenomenon in which white light splits into its constituent colors when it passes through a prism.

12. What is Presbyopia?

Ans: Presbyopia is an age-related vision condition where the eye loses its ability to focus on nearby objects due to reduced elasticity of the lens.

13. What type of image is formed by the eye lens?

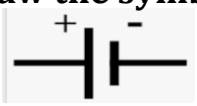
Ans: The eye lens forms a real, inverted, and smaller image on the retina.

14. What is meant by the least distance of distinct vision?

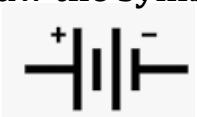
Ans: The least distance of distinct vision is the minimum distance at which an object can be seen clearly without strain, typically about 25 cm for a normal human eye.

QUESTION NO.7

1. Draw the symbol of an electric cell.

Ans: 

2. Draw the symbol of battery

Ans: 

3. Draw the symbol of Plug key or switch.

Ans: 

4. Draw the symbol of an ammeter.

Ans: 

5. Draw the symbol of a voltmeter

Ans: 

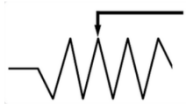
6. Draw the symbol of an electric bulb.

Ans: 

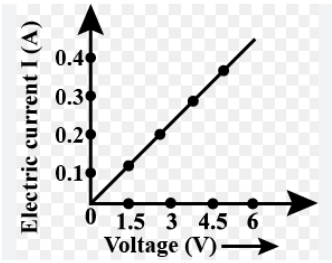
7. Draw the symbol of a resistor.

Ans: 

8. Draw the symbol of rheostat or variable resistance.

Ans: 

9. Draw the V (Potential difference) – I (Current) graph for Ohm's law.

Ans: 

QUESTION NO.8

1. What is the SI unit of resistance of a conductor connected in the electric circuit?

Ans: The SI unit of resistance is ohm (Ω).

2. What is the SI unit of electric charge?

Ans: The SI unit of electric charge is coulomb (C).

3. What is the SI unit of electric current?

Ans: The SI unit of electric current is ampere (A).

4. What is the SI unit of potential difference?

Ans: The SI unit of potential difference is volt (V).

5. What is the SI unit of electric power?

Ans: The SI unit of electric power is watt (W).

6. What is the commercial unit of electrical energy?

Ans: The commercial unit of electrical energy is kilowatt-hour (kWh).

7. Howmany joules are there in one kilowatt hour?

Ans: One kilowatt-hour equals 3.6×10^6 joules.

8. What is the SI unit of resistivity?

Ans: The SI unit of resistivity is ohm-meter (Ω·m).

9. How is an ammeter connected in a circuit?

Ans: An ammeter is connected in series in a circuit.

10. How is voltmeter connected in a circuit?

Ans: A voltmeter is connected in parallel in a circuit.

11. If two resistor 3Ω, 6 Ω are connected in parallel, then what is the equivalent resistsance of combination of resistsors?

Ans: The equivalent resistance of 3Ω and 6Ω in parallel is 2Ω.

12. Name the device that helps to measure the potential difference across a conductor.

Ans: The device used to measure potential difference is a voltmeter.

2 MARK QUESTIONS

QUESTION NO.9

1. Which of the following hydrocarbons undergo addition reactions.

C_2H_6, C_3H_8, C_3H_6, C_2H_2 and CH_4

Ans: **C_3H_6** (propene) and **C_2H_2** (ethyne) undergo addition reactions because they are unsaturated hydrocarbons with double or triple bonds.

2. Identify the alkanes, alkenes and alkynes.

C_2H_6, C_3H_8, C_3H_6, C_2H_2 and CH_4

Ans: Alkanes: C_2H_6, C_3H_8 , CH_4 Alkenes: C_3H_6 Alkynes: C_2H_2

3. General formula of alkanes is C_nH_{2n+2}. Write the first two alkanes.

Ans: First two alkanes are: Methane - CH_4 , Ethane - C_2H_6

4. General formula of alkenes is C_nH_{2n}. Write the first two alkenes.

Ans: First two alkenes are: Ethene - C_2H_4 , Propene – C_3H_6

5. General formula of alkynes is C_nH_{2n-2}. Write the first two alkynes.

Ans: First two alkynes are: Ethyne - C_2H_2 , Propyne - C_3H_4

6. Collect the saturated and unsaturated hydrocarbons in the following.

C_2H_6, C_3H_8, C_3H_6, C_2H_2, C_4H_6, C_5H_{10} and CH_4

Ans: Saturated hydrocarbons: C_2H_6, C_3H_8 and CH_4

Unsaturated hydrocarbons: C_3H_6, C_2H_2, C_4H_6, C_5H_{10}

7. A hydrocarbon has four carbons and ten hydrogens.

(i) Write the formula of this hydrocarbon.

(ii) Write its name

Ans: (i) Formula — **C_4H_{10}** (ii) Its name : **Butane**

8. Complete the following table.

Hydrocarbon	**Methane**		**Propane**	
Formula		**C_2H_6**		**C_4H_{10}**

Ans:

Hydrocarbon	Methane	**Ethane**	Propane	**Butane**
Formula	**CH_4**	C_2H_6	**C_3H_8**	C_4H_{10}

9. Complete the following table.

Class of compounds	**Alcohol**		**Ketene**	
Formula of functional group		**–CHO**		**–COOH**

Ans:

Class of compounds	**Alcohol**	**Aldehyde**	**Ketene**	**Carboxylic Acid**
Functional group	**–OH**	**–CHO**	**–CO–**	**–COOH**

QUESTION NO.10

1. The magnification produced by a plane mirror is +1. What does this mean?

Ans: The magnification of +1 produced by a plane mirror means the image formed is of the same size as the object and is upright (virtual).

2. One-half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer experimentally. Explain your observations.

Ans: Yes, the convex lens will produce a complete image of the object even if one-half is covered with black paper. However, the brightness of the image will be reduced because only the uncovered half contributes to bending light rays to form the image.

3. A ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal? Why?

Ans. The light-ray bends towards the normal because the ray of light goes from a rarer medium to a denser medium.

4. Why do we prefer a convex mirror as a rear-view mirror in vehicles?

Ans.We prefer a convex mirror as a rear-view mirror in vehicles because of two reasons:

i) A convex mirror always ***produces an erect image*** of the objects.

ii) It ***provides a wider field of view***, allowing drivers to see more area behind them.

5. A ray passing through the centre of curvature of a concave mirror, after reflection, is reflected back along the same path. Why?

Ans: A ray passing through the center of curvature of a concave mirror is reflected back along the same path because it strikes the mirror perpendicularly (normal to the surface) at that point, ensuring the angle of incidence and angle of reflection are both zero.

6. Pose any two questions on the concept of refractive index.

Ans: Questions are:

1) How does the refractive index of a medium affect the speed of light passing through it?
2) What is the significance of the refractive index in determining the optical density of a medium?

7. Pose any two questions on the concept of refraction of light.

Ans: Questions are:

a) Why does light change direction when it passes from one medium to another?
b) What happens to the path of light when it travels from a denser medium to a rarer medium?

8. If A,B are optical media of nearly same refractive indices, then what happens if light travel from A to B? (Or)
What happens a ray of light when it travels from one medium to another medium having equal refractive indices.

Ans: When a ray of light travels from one medium to another medium with equal refractive indices, it passes through without bending or changing its direction, as there is no difference in optical density between the two media.

9. If you want to see an enlarged image of your face, which type of mirror will you see? Where will you place your face?

Ans: If I want to see an enlarged image of my face, I will use a concave mirror and place my face between the mirror's focal point and its surface.

QUESTION NO.11

1. Pose any two questions to understand the concept of Ohm's law.

Ans: Questions are:

a) What is the formula of Ohm's law?
b) How does resistance affect current in Ohm's law?

2. Pose any two questions to understand the concept of resistance.

Ans: Questions are:

a) What factors affect the resistance of a conductor?
b) How does the length of a wire influence its resistance?

3. Why is tungsten used almost exclusively for filament of electric lamps?

Ans: Tungsten is used almost exclusively for the filament of electric lamps because it has a very high melting point and excellent electrical conductivity.

4. Why is the series arrangement not used for domestic circuits?

Ans: The series arrangement is not used in domestic circuits because if one appliance fails, the entire circuit is disrupted, and all appliances stop working. Additionally, appliances in series receive the same current, which may not be suitable for all devices.

5. Why copper and aluminium wires are usually employed for electricity transmission?

Ans: Copper and aluminum wires are used for electricity transmission because they have low resistivity and are good conductors of electricity.

6. What happens to the resistivity of a conductor if its length is doubled?

Ans: If the length of a conductor is doubled, its resistance will double, but its resistivity will remain the same.

7. Why should we connect electric appliances in parallel in a household circuit? What happens if they are connected in series?

Ans:(i) We connect electric appliances in parallel because it ensures that each appliance receives the same voltage as the power supply. It also allows each appliance to operate independently, so the failure of one does not affect the others.

(ii) If appliances are connected in series, they share the same current, which may not be suitable for all devices. Additionally, if one appliance fails or is turned off, the entire circuit is disrupted, and all appliances stop functioning.

8. Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal?

Ans. The coils of electric toasters, electric irons and other heating devices are made of an alloy rather than a pure metal because

(i) The resistivity of an alloy is much higher than that of a pure metal, and

(ii) An alloy does not undergo oxidation (or burn) easily even at high temperature, when it is red hot.

9. What happens to the resistance of conductor if its length his doubled and area of cross-section is halved?

Ans. If the length of a conductor is doubled and its cross-sectional area is halved, then its resistance will increase four times.

4 MARK QUESTIONS

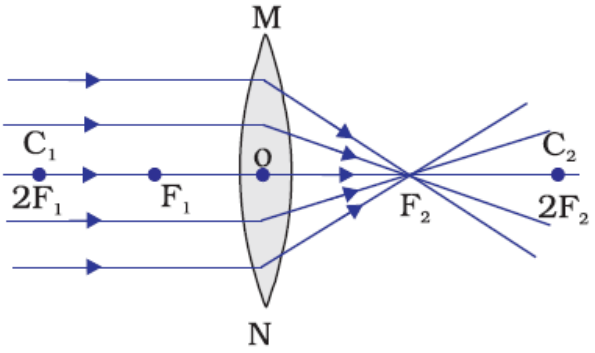
QUESTION NO.12(A)

1. Draw the ray diagram of image formed when object is placed in front of a bi-convex lens in the following positions.

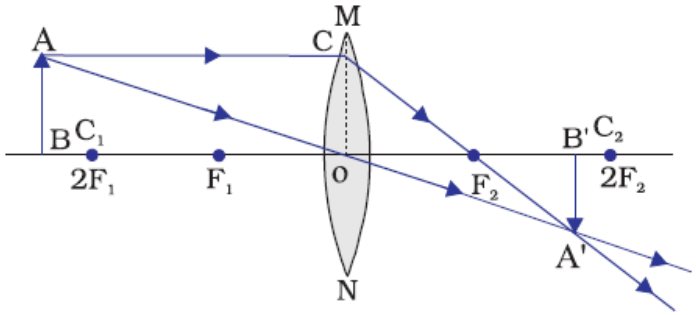
a) At infinity **b) Beyond $2F_1$** **c) At $2F_1$**

d) Between F_1 & $2F_1$ **e) At F_1** **f) Between F_1 & Optical centre O**

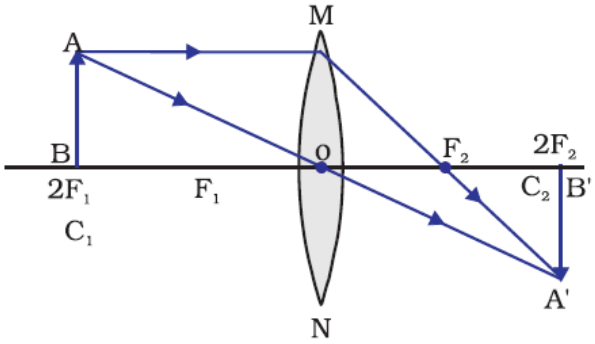
Ans: **a) At infinity**



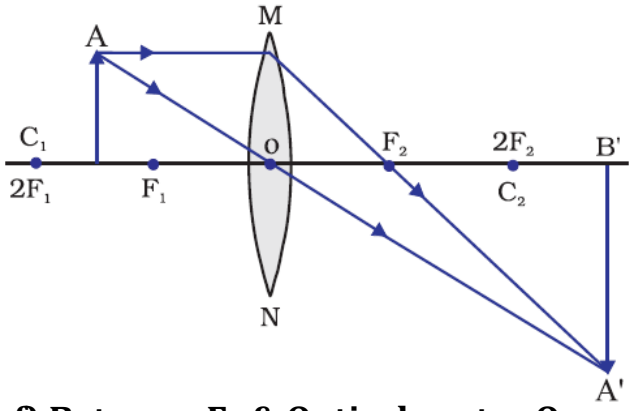
b) **Beyond $2F_1$**



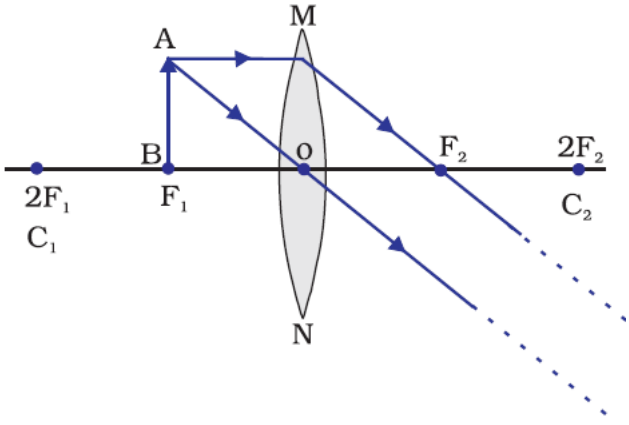
c) At $2F_1$



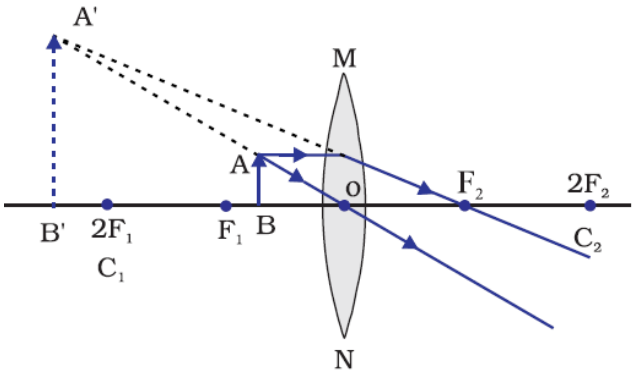
d) Between F_1 & $2F_1$



e) At F_1



f) Between F_1 & Optical centre O

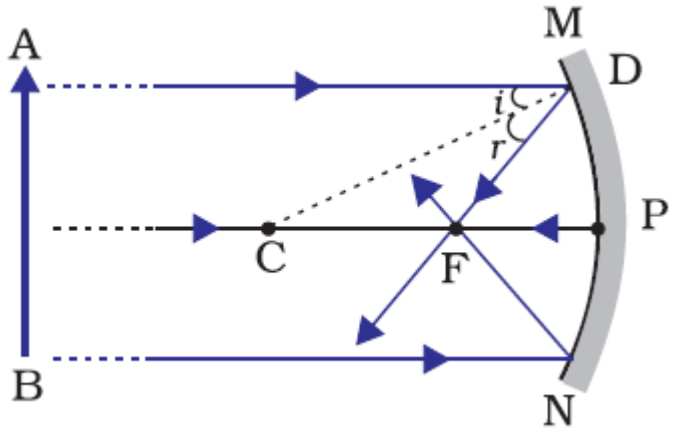


2. Draw the ray diagrams of image formed when the object is placed in front of a concave mirror in the following positions.

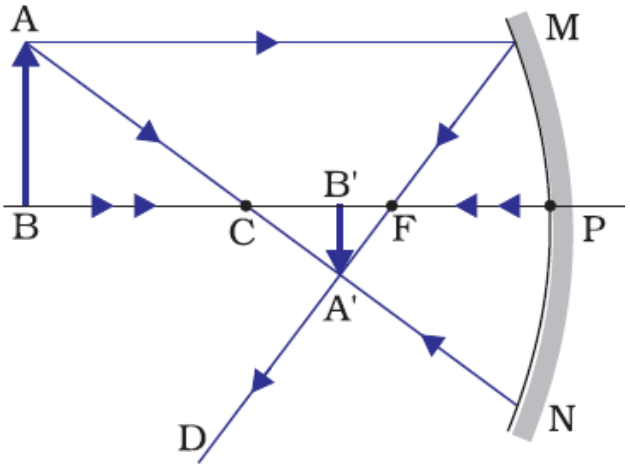
a) At infinity **b) Beyond C** **c) At C**

d) Between C and F **e) At F** **f) Between P and F**

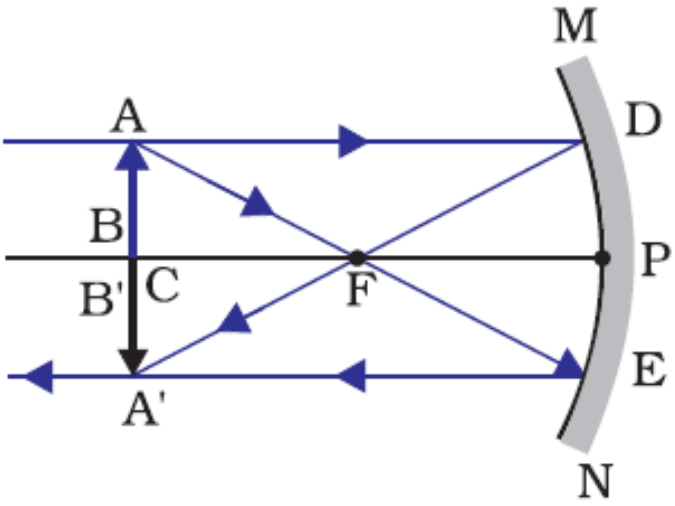
Ans: a) At infinity



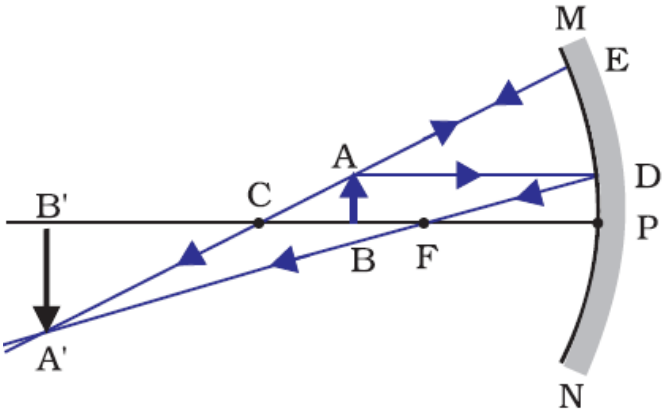
b) Beyond C



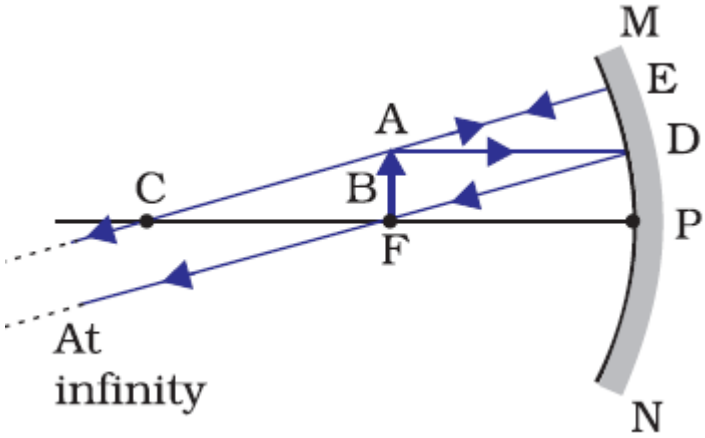
c) At C



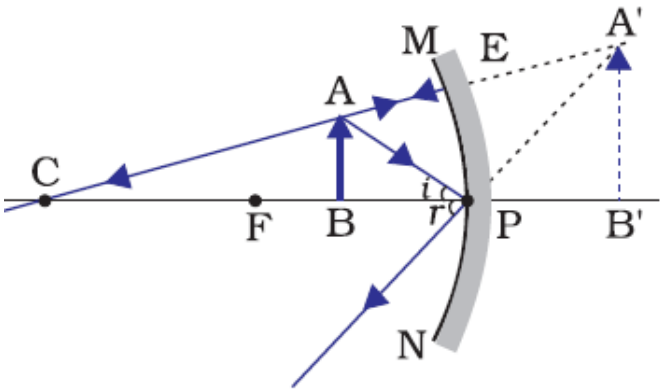
d) Between C and F



e) At F



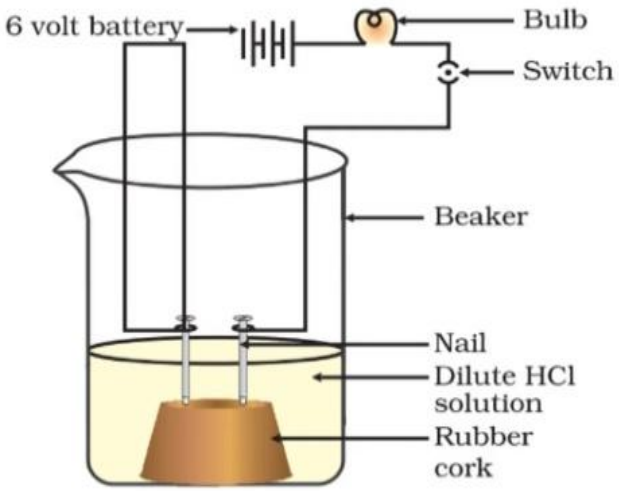
f) Between P and F



QUESTION NO.12(B)

1. Draw the diagram which shows that acid solution in water conducts electricity.

Ans:



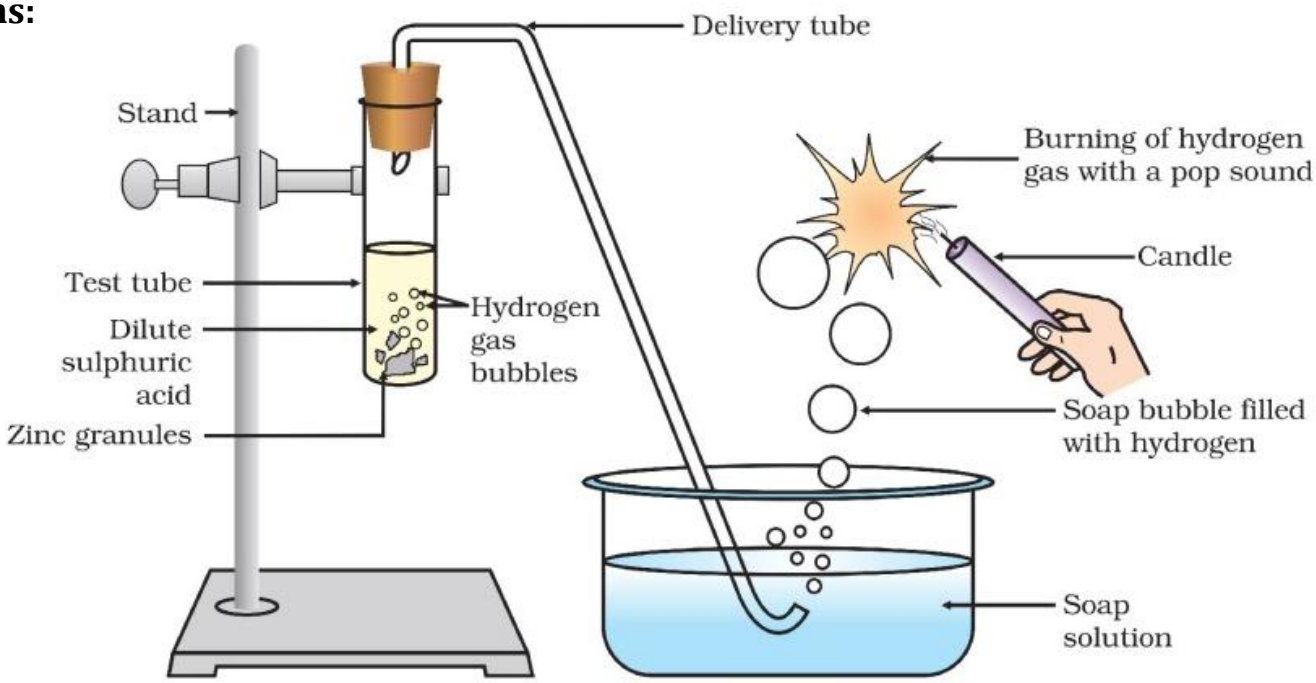
Acid solution in water conducts electricity

2. Draw a diagram of arrangement of apparatus for the reaction of acids with metals.

(Or)

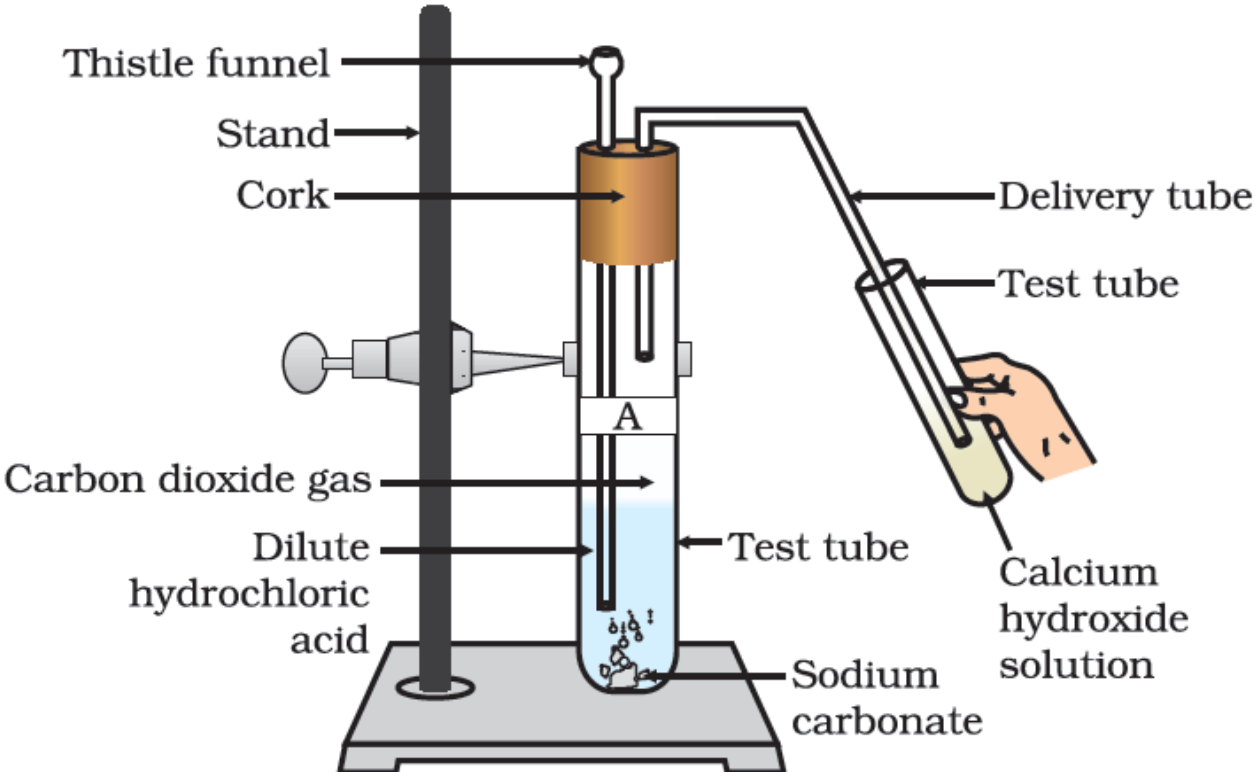
Draw the diagram showing the reaction of zinc granules with dil.HCl and testing hydrogen gas by a burning matchstick.

Ans:



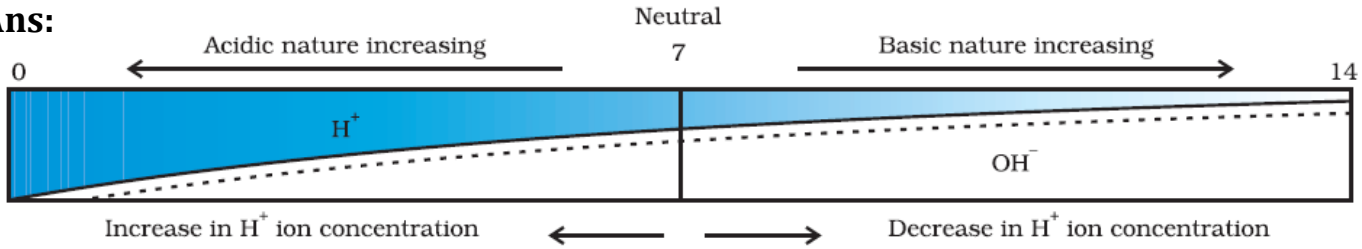
3. Draw a diagram of passing carbon dioxide gas through calcium hydroxide solution when metal carbonates or metal hydrogen carbonates react with acids.

Ans:



4. Draw a diagram showing the variation of pH with the change in concentration of H^+ and OH^- .

Ans:



QUESTION NO.13

1. Give two important uses of washing soda and baking soda.

Ans. Two important uses of washing soda are:

1. It is used in glass, soap, and paper industries.
2. It is used to remove permanent hardness of water.

Two important uses of baking soda are:

1. It is used as baking powder. Baking powder is a mixture of baking soda and a mild acid known as tartaric acid. When it is heated or mixed in water, it releases CO_2 that makes bread or cake fluffy.
2. It is used in soda-acid fire extinguishers.

2. Give two important uses of Bleaching powder and plaster of Paris.

Ans: Uses of Bleaching powder:

- Bleaching cotton and linen in textile industry.
- Disinfecting drinking water.

uses of the Plaster of Paris

- Doctors use POP for supporting fractured bones.
- For making toys, material for decoration.

3. What are the applications of pH in daily life?

Ans: Importance of pH in Everyday Life:

1. Plants and animals can survive only in a narrow range of pH changes. Usually, animal and human bodies work in a pH range of 7 to 7.5.
2. When the pH value of rainwater is below 5.6, then it is called acid rain. It causes the pH value of the water to be dropped and this causes damage to aquatic life.
3. Further, when the pH value of our stomach decreases we get acidity problems.
4. When the pH value of our mouth reduces, our teeth start to decay.

4. A milkman adds a very small amount of baking soda to fresh milk.

(a) Why does he shift the pH of the fresh milk from 6 to slightly alkaline?

(b) Why does this milk take a long time to set as curd?

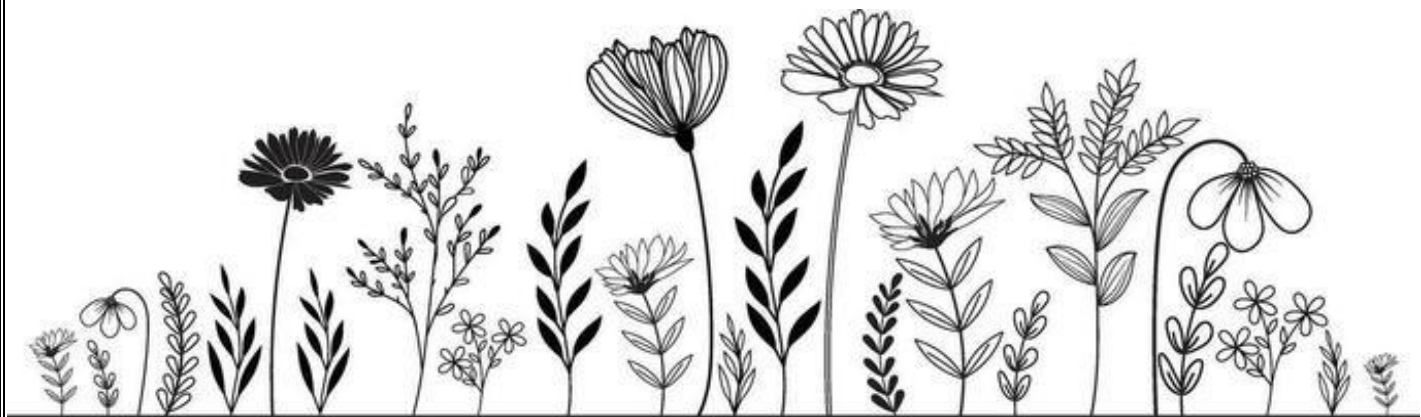
Ans. (a) The milkman shifts the pH of the fresh milk from 6 to slightly alkaline because in alkaline condition, milk does not set as curd easily.

(b) Since this milk is slightly basic than usual milk, acids produced to set the curd are neutralized by the base. Therefore, it takes a longer time for the curd to set.

5. Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? Explain your answer.

Ans. The pH of milk is 6. As it changes to curd, the pH will reduce because curd is acidic in nature. The acids present in it decrease the pH.

Explanation: The pH of fresh milk is 6 which is acidic in nature. This milk is converted to curd by the action of bacteria which further increases the acidity of the curd and decreases its pH value from 6 and it becomes less than 6. The acidic strength increases on going down the pH scale from 7 to 1.



QUESTION NO.14

1. Observe the table and answer the following questions.

Material medium	Air	Ice	Ruby	Benzene
Refractive index	1.0003	1.31	1.71	1.50

i) In Which material medium the light travels faster?

ii) Which is denser medium?

iii) In which material medium the speed of light is least?

iv) Calculate the speed of light in Benzene?

(Speed of light in vacuum is 3 x $10^8 ms^{-1}$).

Ans: i) Light travels fastest in air because it has the lowest refractive index (1.0003).

ii) Ruby is the denser medium.

iii) The speed of light is least in ruby.

iv) For Benzene refractive index = 1.50

Speed of light in the medium = $\frac{Speed\ of\ light\ in\ vacuum}{Refractive\ \ index\ of\ the\ medium} = \frac{3X10^8}{1.5}$ = 2X 10^8 m/s

2. Observe the table and answer the following questions.

Material medium	Air	Ice	Ruby	Benzene
Refractive index	1.0003	1.31	1.71	1.50

i) Which material medium is optically rarer?

ii) Which material medium is optically denser?

iii) Write the relation between refractive index and speed of light in the medium?

(iv) What is the SI unit of Refractive index?

Ans: (i) Air is the optically rarer.

(ii) Ruby is optically denser.

(iii) The relation between the refractive index (n) and the speed of light in a medium is:

$$Absolute\ refractive\ index\ (n)\ = \frac{Speed\ of\ light\ in\ vacuum\ \ (c)}{Speed\ of\ light\ in\ medium\ \ (v)}$$

(iv) The refractive index has no SI unit

3. Fill the following table which is related to the convex lens.

Position of the Object	Position of the image	Relative size of the image	Nature of the image
Beyond $2F_1$			**Real and inverted**
	at $2F_2$	**Same size**	
Between F_1 and $2F_1$		**Enlarged**	
	same side of the object		**Virtual and erected**

Ans:

Position of the Object	Position of the image	Relative size of the image	Nature of the image
Beyond $2F_1$	**Between F_2 and $2F_2$**	**Diminished**	Real and inverted
At $2F_1$	at $2F_2$	Same size	**Real and inverted**
Between F_1 and $2F_1$	**Beyond $2F_2$**	Enlarged	**Real and inverted**
Between F_1 and O	same side of the object	**Enlarged**	Virtual and erected

4. Fill the following table which is related to the concave mirror.

Position of the Object	Position of the image	Size of the image	Nature of the image
At infinity		**Highly diminished, point-sized**	
	At 2F		**Real and inverted**
Between C and F			**Real and inverted**
At F		**Highly enlarged**	

Ans:

Position of the Object	Position of the image	Size of the image	Nature of the image
At infinity	**At F**	Highly diminished, point-sized	**Real and inverted**
At C	At 2F	**Same size**	Real and inverted
Between C and F	**Beyond C**	**Magnified and enlarged**	Real and inverted
At F	**At infinity**	Highly enlarged	**Real and inverted**

8 MARK QUESTIONS

(INTERNAL CHOICE)

QUESTION NO.15(A)

1. Explain the following:

(i) Twinkling of stars (ii) Formation of Rainbow

Ans: **(i) Twinkling of stars:**

a) Stars twinkle due to the atmospheric refraction of star light.

b) As the stars are very far away, they behave as almost a point source of light.

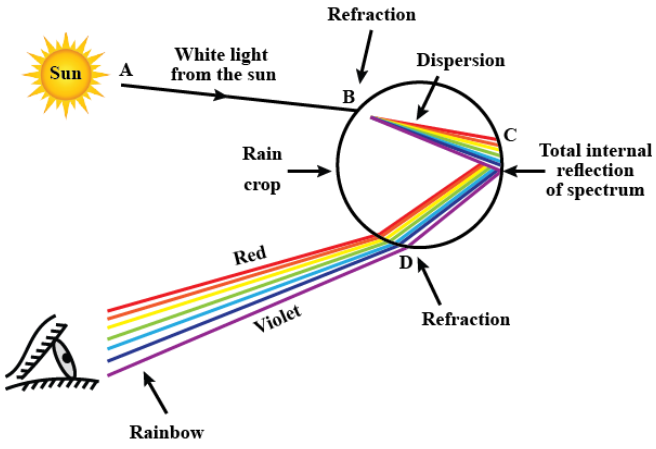
c) When the light coming from stars enters the earth's atmosphere, it gets refracted at different levels because of the variation in the air density.

d) The path of rays of light coming from the star goes on varying slightly, the apparent position of the star fluctuates and the amount of starlight entering the eye flickers.

e) So, sometimes, the star appears brighter and at some other time, fainter. Thus, the stars twinkle.

(ii) Formation of Rainbow:

1. A rainbow is a natural spectrum appearing in the sky after a rain shower.
2. It is caused by dispersion of sunlight by tiny water droplets, present in the atmosphere.
3. A rainbow is always formed in a direction opposite to that of the Sun. The water droplets act like small prisms.
4. They refract and disperse the incident sunlight, then reflect it internally, and finally, refract it again when it comes out of the raindrop.
5. Due to the dispersion of light and internal reflection, different colors reach the observer's eye.



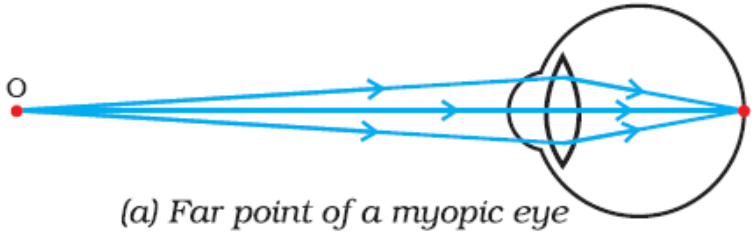
2. Explain, how do you correct the eye defect Myopia with a suitable diagram.

(Or)

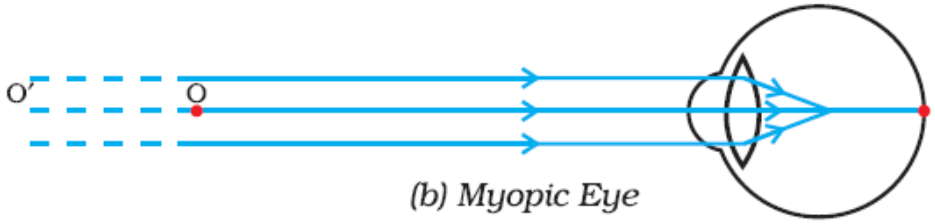
What is Myopia? How do you correct the eye defect Myopia?

Ans. 1. Some people cannot see objects at long distances but can see nearby objects clearly. This type of vision defect is called myopia (nearsightedness).

2. In this case, the eye lens can form an image in front of the retina.

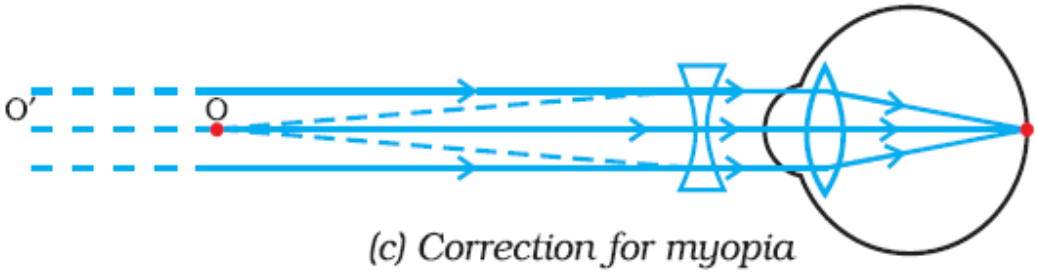


(a) Far point of a myopic eye



(b) Myopic Eye

3. Myopia is corrected by using a concave lens of focal length equal to the distance of the far point F from the eye.



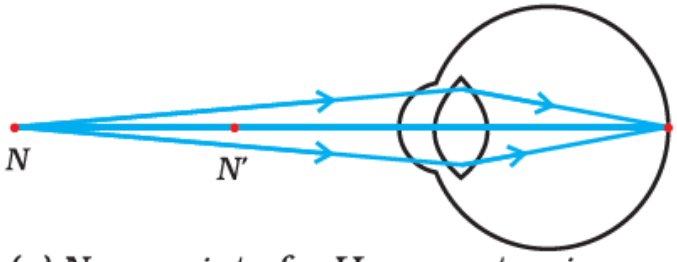
(c) Correction for myopia

4. This lens diverges the parallel rays from a distant object as if they are coming from the far point.
5. Finally the eye lens forms a clear image on the retina.

3. Explain the correction of the eye defect Hypermetropia with asuitable diagram.

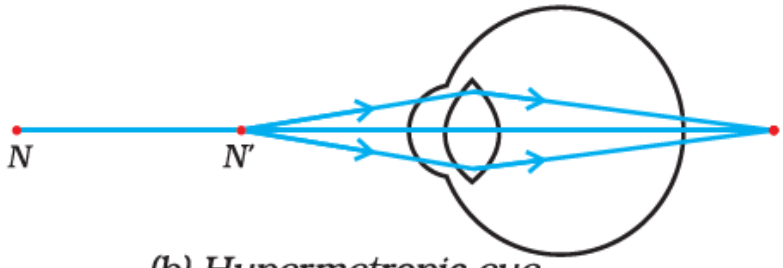
Ans. 1. Some people can see the distant objects clearly but cannot see objects at near distances. This type of vision defect is called hypermetropia (far sightedness).

2. In this case the eye lens can form an image beyond the retina.

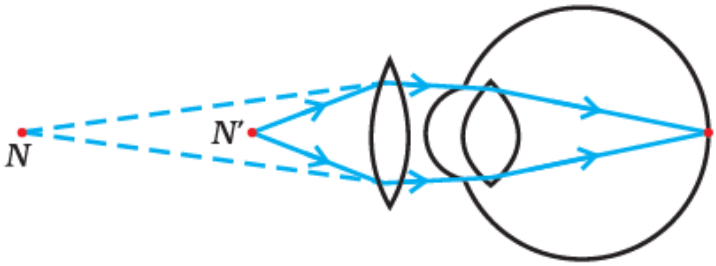


(a) Near point of a Hypermetropic eye

3. To correct the defect of hypermetropia, we need to use a lens which forms an image of an object beyond the near point at H, when the object is between H and L. This is possible only when a double convex lens is used.



(b) Hypermetropic eye



(c) Correction for Hypermetropic eye

4. The image acts like an object for the eye lens. Hence final image due to the eye is formed at the retina.

4. Explain the following.

(a) Scattering of light **b) Tyndall effect**

Ans: (a) Scattering of Light : When light falls on various types of suspended particles, it is deviated from its path in random directions. This phenomenon is called scattering. Thus, the deviation of light from its path randomly in all directions is called the scattering of light.

Phenomenon due to scattering of light:

(i) Blue Colour of Sky: As the sunlight passes through the atmosphere, the blue colour is preferentially scattered. Some of this scattered light reaches the ground, where we see it as blue skylight.

(ii) White Colour of Clouds: The size of clouds is very large as compared to the wavelength of the incident light, from the sun. They scatter all wavelengths of light nearly uniformly. Hence, clouds appear white.

(iii) Red Colour of Danger Signal Lights: When light falls on signal, all colours are scattered much more than red colour. So, the red colour suffering least scattering, remains confined around the signal which in turn illuminates the signal. Thus, signal can be seen from very far off distances.

(b) Tyndall effect: The Tyndall effect is the scattering of light by particles in a colloid or in a fine suspension, making the light beam visible. It is commonly observed in phenomena like sunlight passing through a fog or a dusty room.

(i) Examples of the Tyndall Effect:

1) In Nature:

- The blue color of the sky is due to the scattering of sunlight by atmospheric particles.
- Sunlight streaming through a canopy of trees in a foggy forest.

2) In Everyday Life:

- A beam of light from a torch or projector becomes visible when passing through a dusty room.
- Headlights of a car in foggy weather.

5. Explain the following:

(a) Myopia **(b) Hypermetropia**

(c) Presbyopia **(d) Power of accommodation of eye lens**

Ans: (a) Myopia:

1. Some people cannot see objects at long distances but can see nearby objects clearly. This type of vision defect is called myopia (nearsightedness).
2. In this case, the eye lens can form an image in front of the retina.
3. Myopia is corrected by using a concave lens of focal length equal to the distance of the far point F from the eye.

(b) Hypermetropia:

1. Some people can see the distant objects clearly but cannot see objects at near distances. This type of vision defect is called hypermetropia (far sightedness).
2. In this case the eye lens can form an image beyond the retina.
3. To correct the defect of hypermetropia, we need to use a lens which forms an image of an object beyond the near point at H, when the object is between H and L. This is possible only when a double convex lens is used.

(c) Presbyopia:

1. The eye which suffers from myopia as well as from hypermetropia is said to suffer from presbyopia. It is corrected by a bi-focal lens.

Causes of Presbyopia: (i) Gradual weakening of ciliary muscles.
(ii) Diminishing flexibility of eye lens.

(d) Power of accommodation of eye lens:

1. The ability of the eye lens to see far and near objects by adjusting its focal length is called the accommodation of the eye.
2. The ciliary muscles can modify the curvature of the lens.

6. Explain the following a) Ciliary muscles (b) Atmospheric refraction

Ans: (a) Ciliary muscles:

1. The ciliary muscle to which the eye lens is attached helps the eye lens to change its focal length by changing the radii of curvature of the eye lens.
2. When the eye is focused on a distant object, the ciliary muscles are relaxed so that the focal length of the eye lens has its maximum value which is equal to its distance from the retina.
3. When the eye is focused on a closer object, the ciliary muscles are strained and the focal length of the eye-lens decreases.
4. The ciliary muscles adjust the focal length in such a way that the image is formed on the retina and we see the object clearly.
5. This process of adjusting focal length is called "accommodation".

(b) Atmospheric refraction:

(i) Rising and setting of sun appears visible even if below the horizon. The rising and setting sun becomes visible even if it is below the horizon due to refraction of light from layers of air near the earth's surface and the length of day is increased by nearly 4 minutes due to this phenomenon.

(ii) Twinkling of stars: Since the atmosphere bends starlight towards the normal, the apparent position of the star is slightly different from its actual position. This apparent position of The star is not stationary, but keeps on changing slightly, as the physical conditions of the earth's atmosphere are not stationary.

QUESTION NO.15(B)

1. Deduce the expression for the equivalent resistance of three resistors connected in parallel in an electric circuit.

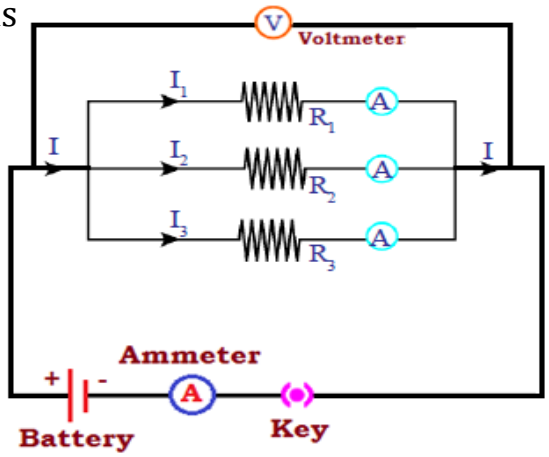
Ans.

1. In the figure, the resistors are connected in parallel.
2. In parallel connection of resistors, the potential difference is the same for all resistors.
3. Hence, the potential difference in the circuit is equal to V.
4. According to Ohm's law, at resistance R,

Current through R_1 is, $I_1 = \frac{V}{R_1}$ ..... (1)

Current through R_2 is, $I_2 = \frac{V}{R_2}$ ..... (2)

Current through R3 is, $I_3 = \frac{V}{R_3}$ ..... (3)



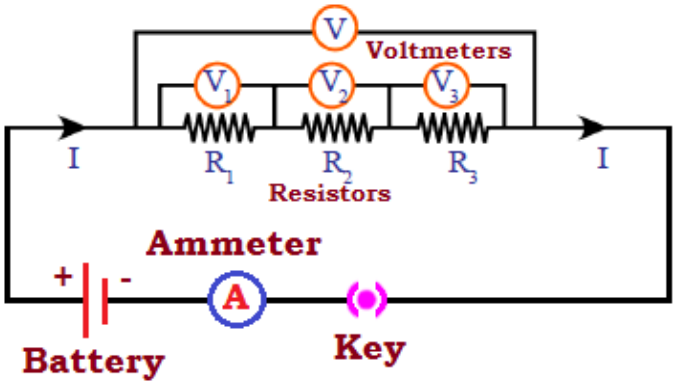
5. Let R_{eq} be the equivalent resistance of the resistors in parallel.
6. Then we get; $I = \frac{V}{R_{eq}}$ ..... (4)
7. The current in the circuit is equal to the sum of individual currents through each resistance.
8. Hence, we can write $I = I_1 + I_2 + I_3$..... (5)
9. Substituting the values I, I_1, I_2 and I_3 in equation (5), we get

$$\frac{V}{R_{eq}} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} = V\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)$$

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

2. Deduce the expression for the equivalent resistance of three resistors connected in series.

Ans:



1. In the above figure, the resistors are connected in series and there is only one path for the flow of current in the circuit.
2. Hence, the current in the circuit is equal to I.
3. According to Ohm's law, at resistance R,
   The potential difference across R_1 is, $V_1 = IR_1$..... (1)
   The potential difference across R_2 is, $V_2 = IR_2$..... (2)
   The potential difference across R_3 is, $V_3 = IR_3$..... (3)
4. Let R_{eq} is the equivalent resistance of the combination of resistors in series.
5. If the current drawn by a resistor is equal to the current drawn by the combination of resistors then the resistor is called an equivalent resistor (provided the source in the circuit is constant).
   So, we have $V = I R_{eq}$..... (4)
6. The resultant potential is equal to the sum of the potentials at each resistor.
   Therefore, $V = V_1 + V_2 + V_3$..... (5)
7. Substituting the values of V_1, V_2, V_3 and V in the equation (5), we get,

   $IR_{eq} = IR_1 + IR_2 + IR_3$

   $IR_{eq} = I(R_1 + R_2 + R_3)$ $\qquad$ $R_{eq} = R_1 + R_2 + R_3$

8. From the above equation we can conclude that the sum of individual resistances is equal to their equivalent resistance when the resistors are connected in series.

3. Explain the following:

(i) Electric current **ii) Potential difference**

(iii) Ohm's law **iv) Electric power**

Ans:

1. Electric Current (I):

- The rate of flow of electric charges through a conductor is known as electric current.

$$Electric\ \ current = \frac{Charge}{Time} = \frac{Q}{t}$$

- S. I. unit of current = Ampere (A)
- 1 Ampere = 1 Coulomb / 1sec
- Current is measured by Ammeter. Its symbol is —(A)—

2. Potential Difference (V):

- The amount of work done in moving unit positive charge from one point to another in an electric field is known as potential difference.

$$Potentia\ difference = \frac{Work\ done}{Quantity\ of\ \ charge\ tranferred}$$

V = W/Q

- S. I. unit of Potential difference = Volt (V);
- Voltmeter is an instrument to measure the potential difference.
- It has high resistance and always connected in parallel. Symbol is —(V)—

3. Ohm's Law: At constant temperature the current flowing through a conductor is directly proportional to the potential difference across its ends.

Mathematical expression for Ohm's law V **α** I

$$\Rightarrow \mathbf{V = IR}$$

Where:

- **V** is the voltage (in volts),
- **I** is the current (in amperes),
- **R** is the resistance (in ohms).

4. Electric Power: The rate at which electric energy is consumed or dissipated in an electric circuit :

$Electric\ power\ (P) = VI = I^2R = \frac{V^2}{R}$ S.I unit of power = Watt (W)

QUESTION NO.16(A)

1. Explain the following with an example.

i) Chemical combination **ii) Chemical decomposition**

ii) Chemical displacement **d) Chemical double displacement**

Ans: Chemical reactions can be classified into combination, decomposition, displacement and double displacement reactions.

1. **Combination reaction:** A reaction in which two or more substances combine to form a new single substance is called a combination reaction.

$$CaO\ (l) + H_2O(l) \longrightarrow Ca(OH)_2\ (aq)$$

Quick lime Water Slaked lime

2. **Decomposition reaction:** In decomposition reaction, a single substance decomposes to give two or more simpler substances.

$$CaCO_3\ (s) \xrightarrow{Heat} CaO\ (s) + CO_2\ (g)$$

Limestone Quick lime Carbon dioxide

3. **Displacement reaction:** The reaction in which a more reactive element displaces a less reactive element from its salt solution is called displacement reaction. In displacement reaction, one atom or a group of atoms of a compound is replaced by another atom or group of atoms.

$$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$$

Iron Copper sulphate Iron sulphate Copper

4. **Double displacement reactions:** The reactions in which two compounds exchange their ions to form two new compounds are called double displacement reactions.

$$Na_2SO_4\ (aq) + BaCl_2\ (aq) \longrightarrow BaSO4\ (s) + 2NaCl\ (aq)$$

Sodium sulphate Barium chloride Barium sulphate Sodium chloride

2. What is a chemical reaction? How many types of chemical reactions are there? Explain each with one example.

Ans: (i) A chemical reaction is a process in which substances (reactants) undergo chemical changes to form new substances (products) with different properties.

(ii) The chemical reactions are classified into different classes depending upon the type of chemical changes taking place. They are:

a) Combination Reaction b) Decomposition Reaction

c) Displacement Reaction d) Double displacement Reaction

e) Exothermic and Endothermic Reactions

f) Oxidation and Reduction Reaction.

a) Combination Reaction: A reaction in which two or more reactants combine to form a single product, is called combination ration.

Ex: $\mathbf{C\ (s) + O_2\ (g)} \longrightarrow CO_2\ (g)$

Carbon Oxygen Carbon dioxide

b) Decomposition reaction: a reaction, in which a single reactant breaks down to form two or more products, is known as decomposition reaction.

$CaCO_3\ (s) \xrightarrow{Heat} CaO\ (s) + CO_2\ (g)$

Limestone Quick lime Carbon dioxide

c) Displacement Reaction: The reaction in which a more reactive element displaces a less reactive element from its salt solution is called displacement reaction.

$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$

Iron Copper sulphate Iron sulphate Copper

(d) Double displacement reactions: The reactions in which two compounds exchange their ions to form two new compounds are called double displacement reactions.

$Na_2SO_4\ (aq) + BaCl_2\ (aq) \longrightarrow BaSO4\ (s) + 2NaCl\ (aq)$

Sodium sulphate Barium chloride Barium sulphate Sodium chloride

e) Exothermic and Endothermic Reactions:

1. Reactions in which heat is given out along with the products are called **exothermic reactions**.

$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O + Heat$

Methane Oxygen Carbon dioxide Water

2. Reactions in which heat is absorbed are known as **endothermic reactions**.

$CaCO_3 \longrightarrow CaO + CO_2$

Limestone calcium oxide carbon dioxide

f) Oxidation and Reduction Reaction.

1. Oxidation is a process which involves gain of oxygen or loss of hydrogen.

$\mathbf{2Cu + O_2 \longrightarrow 2CuO}$

Copper Oxygen Copper oxide

2. Reduction is a process which involves gain of hydrogen or loss of oxygen.

$\mathbf{2Na + H_2 \longrightarrow 2NaH}$

Sodium Hydrogen Sodium Hydride

3. What is the difference between displacement and double displacement reactions? Write equations for the above.

Ans: 1. In displacement reactions, a more reactive metal displaces a less reactive metal from its solution.

Example: $Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$

This is a displacement reaction where iron displaces copper from its solution.

2. In double displacement reactions, two reactants in solution exchange their ions.

Example: $AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$

This is a double displacement reaction where silver nitrate and sodium chloride exchange chloride ion (Cl^-) and nitrate ion (NO_3^-) between them.

4. Explain the following terms with one example each

(i) Corrosion (ii) Rancidity iii) Oxidation iv) reduction

Ans: (a) Corrosion:

1. When a metal is attacked by substances around it such as moisture, acids, etc., it is said to corrode and this process is called corrosion.
   Ex: (i) The black coating on silver.
2. Corrosion causes damage to car bodies, bridges, iron railings, ships and to all objects made of metals, especially those of iron.
3. Methods to Prevent Corrosion: painting, oiling, galvanizing, alloying

(b) Rancidity:

1. When fats and oils are oxidised, they become rancid and their smell and taste change. This process is called rancidity.
2. To prevent rancidity, substances which prevent oxidation (antioxidants) are added to foods containing fats and oil.
3. Keeping food in air tight containers helps to slow down oxidation.

(c) Oxidation : It is defined as a process which involves gain of oxygen.

For example,

$2MgO(s) + O_2(g) \longrightarrow 2MgO$

Magnesium Oxygen Magnesium oxide

Here, Mg has gained oxygen to form MgO. Hence, Mg has been oxidised to MgO.

(d) Reduction: It is defined as the process which involves loss of oxygen.

For example,

(i) $CuO(s) + H_2(g) \xrightarrow{Heat} Cu(s) + H_2O(l)$

Copper oxide Hydrogen Copper Water

In this reaction, copper oxide is losing oxygen. So, it is being reduced to copper.

5. Balance the following chemical equations.

(a) $HNO_3 + Ca(OH)_2 \longrightarrow Ca(NO_3)_2 + H_2O$

(b) $NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O$

(c) $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$

(d) $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + HCl$

Ans: (a) $HNO_3 + Ca(OH)_2 \longrightarrow Ca(NO_3)_2 + H_2O$

Balanced chemical equation: $2HNO_3 + Ca(OH)_2 \longrightarrow Ca(NO_3)_2 + 2H_2O$

(b) $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

Balanced chemical equation: $2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$

(c) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

Balanced chemical equation: $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$

(d) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + HCl$

Balanced chemical equation: $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

6. Write the balanced chemical equation for the following reactions.

a) Calcium hydroxide + Carbon dioxide →Calcium carbonate + Water

b) Zinc + Silver nitrate → Zinc nitrate + Silver

c) Aluminium + Copper chloride →Aluminium chloride + Copper

d) Barium chloride + Potassium sulphate →Barium sulphate + Potassium chloride

Ans: a) $2Ca(OH)_2\,(aq) + 2CO_2\,(g) \longrightarrow 2CaCO_3\,(s) + 2H_2O\,(l)$

b) $Zn\,(s) + 2AgNO_3\,(aq) \longrightarrow Zn(NO_3)_2\,(aq) + 2Ag\,(s)$

c) $2Al\,(s) + 3CuCl_2\,(aq) \longrightarrow 2AlCl_3\,(aq) + 3Cu\,(s)$

d) $BaCl_2\,(s) + K_2SO_4\,(aq) \longrightarrow BaSO_4\,(s) + 2KCl\,(aq)$

QUESTION NO.16(B)

1. Explain the cleaning of soap. (OR)

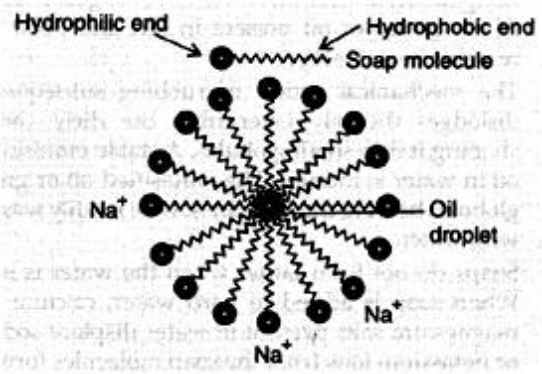
Explain the mechanism of the cleaning action of soaps.

Ans:a) A soap molecule is a sodium or potassium salt of long chain carboxylic acid.

b) It consists of two parts, i.e., a long hydrocarbon tail and a negatively charged head.

c) The hydrocarbon tail is hydrophobic, i.e., insoluble in water and repelled by water while the polar end is soluble in water and hydrophilic in nature.

d) When soap is applied on a wet dirty surface, the polar end of the soap molecule dissolves in water while the non-polar end attaches it to dirt molecule, as dirt is non-polar in nature.

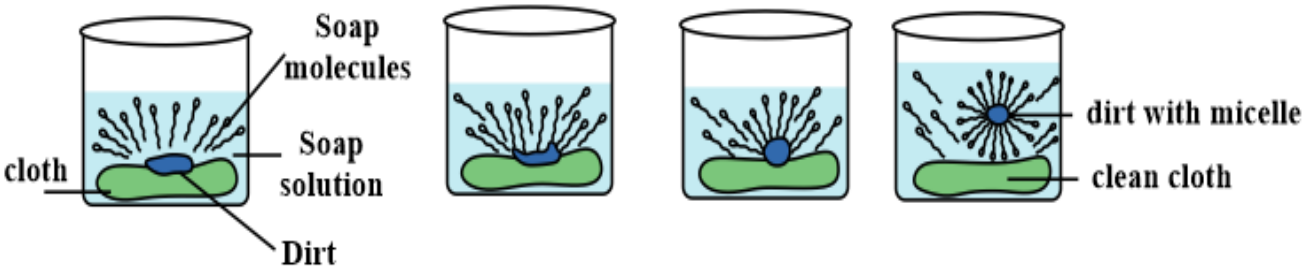


e) This results in the formation of spherical clusters called as Micelles.

f) In micelle the hydrophobic tails are in the interior of the cluster while the ionic ends are on the surface of the cluster.

g) Due to ion-ion repulsion the micelle stay in the solution as a colloid and do not come together to form precipitate.

h) Thus, an emulsion is formed which helps to dissolve dirt in water and it is finally washed with running water.



Representing the cleansing action of soap

2. Explain the following:

(i) Homologous series **(ii) Substitution reaction**

Ans: **(i) Homologous series:**

- ❖ It is a family of organic compounds having the same functional group in which the formulae of successive members differ by — CH_2 group.
- ❖ For example, homologous series of alkane: CH_4, C_2H_6, C_3H_8, etc. are homologous.
- ❖ All the homologous series have similar structures and similar chemical properties.

Hydrocarbon Series: General formula for homologous series of saturated hydrocarbons is $C_n H_{2n+2}$. e.g.

n=1, CH_4 (methane) n=2, C_2H_6 (ethane) n=3, C_3H_8 (propane)

n=4, C_4H_{10} (Butane) n=5, C_5H_{12} (Pentane) n=6, C_6H_{14} (Hexane)

Methane, ethane, propane, butane, pentane, etc., are called homologue of each other.

Main Characteristics of Homologous Series

1. All the members of a homologous series can be represented by the same general formula.
2. Any two adjacent homologous differ by 1 carbon atom and 2 hydrogen atoms in their molecular formula.
3. All the compounds of a homologous series show similar chemical properties.
4. The difference in the molecular masses of any two adjacent homologous or members is 14 u.

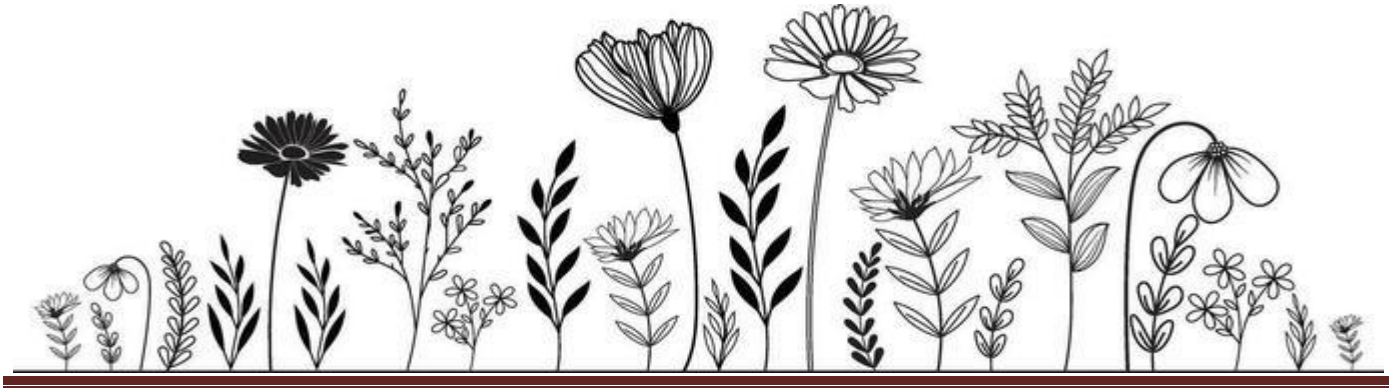
(ii) Substitution reaction:

The reaction in which one or more hydrogen atoms of a hydrocarbon are replaced by some other atoms (like chlorine), is called a substitution reaction.

Ex: In the presence of sunlight, chlorine is added to hydrocarbons in a very fast reaction. Chlorine can replace the hydrogen atoms one by one. It is called a substitution reaction because one type of atom or a group of atoms takes the place of another. A number of products are usually formed with the higher homologues of alkanes.

$$CH_4 + Cl_2 \xrightarrow{Sun\ light} CH_3Cl + HCl$$

Methane Chlorine Chloromethane Hydrogen chloride



3. How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties. (Or)
How would you distinguish experimentally between a alcohol and a carboxylic acid.

Ans:

Ethanol	Ethanoic Acid
1. Ethanol has a pleasant smell.	1. Ethanoic acid pungent smell.
2. The boiling point of ethanol is 351K	2. The boiling point of ethanoic acid is 391 K
3. Ethanol reacts with alkaline $KMnO_4$ to give ethanoic acid.	3. Ethanoic acid does not react with alkaline $KMnO_4$.
4. Ethanol does not react with sodium hydrogen carbonate	4. It gives brisk effervescence with sodium hydrogen carbonate. $CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + H_2O + CO_2\uparrow$

4. Write the differences between soap and detergent.

Ans:

Soap	Detergent
1) Soap is potassium or sodium salts of a carboxylic acid attached to a long aliphatic chain.	1) Detergent is the potassium or sodium salts of a long alkyl chain ending with a sulfonate group.
2) Soap is a metal salt of fatty acid that we use for cleaning and lubrication.	2) Detergent is a mixture of surfactants with cleaning properties in dilute solutions.
3) Minerals present in solution significantly increase the effectiveness of soap.	3) Minerals present in solution do not affect the characteristics of detergent.
4) Soaps are easily biodegradable.	4) Detergents are not easily biodegradable.
5) Soaps are hydrophilic due to the presence of carboxylate at the end of its molecular structure.	5) Its solubility is attributed to the fact that the sulfonate group does not attach itself to the ions present in hard water.
6) Soap is generally prepared from plant and animal fats through saponification.	6) Petroleum (Petrochemicals) was found to be a plentiful source for the manufacture of detergent.

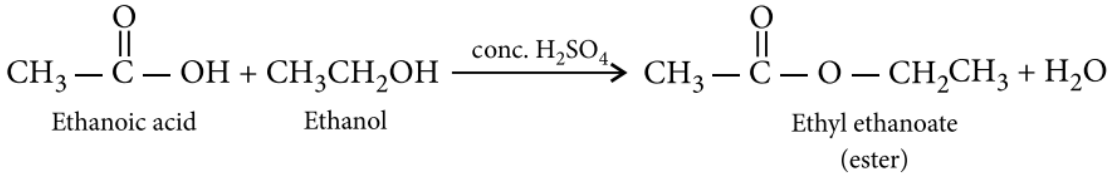
5. Explain any two chemical properties of carbon compounds.

Ans: (i) Combustion: When carbon burns in the presence of oxygen, it produces heat and light. This process of burning carbon and its compounds to release energy is known as combustion.

$$\mathbf{CH_4 + 2O_2 \longrightarrow CO_2 + 2\,H_2O + Heat\ and\ light}$$

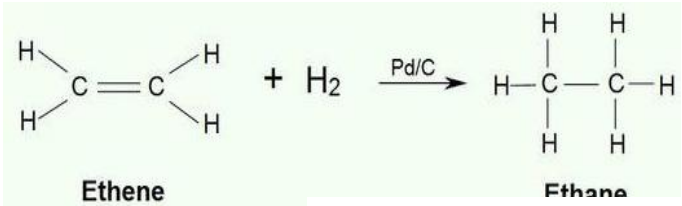
Methane Oxygen Carbon dioxide water

(ii) Oxidation: Oxidation means controlled combustion. For example, when ethanol is heated with alkaline potassium permanganate solution or acidified potassium dichromate solution, it gets oxidized to ethanoic acid.



(iii) Addition Reaction: Unsaturated hydrocarbons react with hydrogen in the presence of catalysts to give saturated **hydrocarbons** and this reaction is known as addition reaction.

Addition reaction is observed only for those compounds that have un saturation that is the compounds that contain multiple bonds (double bond, triple bond) in them.



(iv) Substitution Reaction: The reaction in which one or more hydrogen atoms of a hydrocarbon are replaced by some other atoms (like chlorine), is called a substitution reaction.

$$CH_4 + Cl_2 \xrightarrow{Sun\ light} CH_3Cl + HCl$$

Methane Chlorine Chloromethane Hydrogen chloride

(Any two of the above reactions)

QUESTION NO.17(A)

1. Explain how a compass needle is deflected which is kept near a current carrying metallic conductor. (Oersted's experiment)

(Or)

How can it be shown with the help of an activity that a magnetic field is produced around a current carrying wire.

(Or)

Describe with the help of a diagram an activity to show that a current carrying wire behaves like a magnet.

Ans: **Aim:** To show that a current-carrying wire behaves like a magnet.

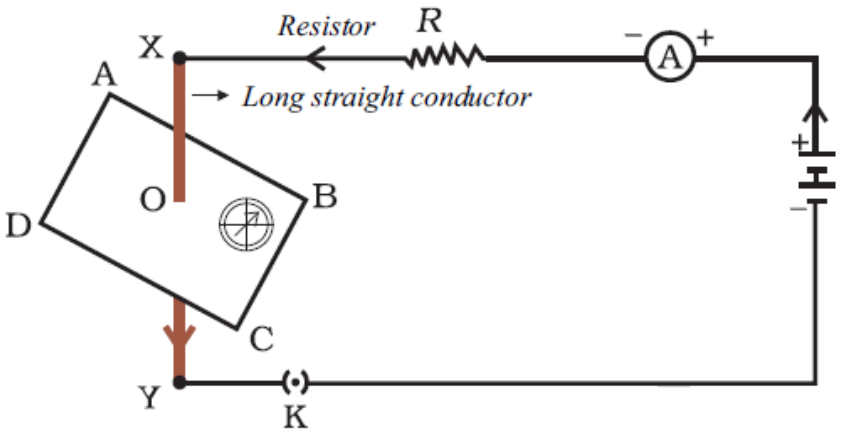
Materials Required: Copper wire, battery, plug key, variable resistance, paper and compass needle.

Procedure:

1. Take a straight thick copper wire and place it between the points X and Y in an electric circuit as shown in figure. The wire XY is kept perpendicular to the plane of paper.
2. Horizontally, place a small compass near to this copper wire. See the position of its needle.
3. Pass the current through the circuit by inserting the key into the plug.
4. Observe the change in the position of the compass needle.

Observation: As we pass current through the copper wire XY, the compass needle gets deflected.

Conclusion: Since, a magnetic needle can be deflected only by a magnetic field, so a current carrying wire behaves like a magnet.



2. Describe an activity to show the formation of magnetic lines around a current carrying conductor.

3. Describe an activity to show that magnetic field is produced around a current carrying straight conductor.

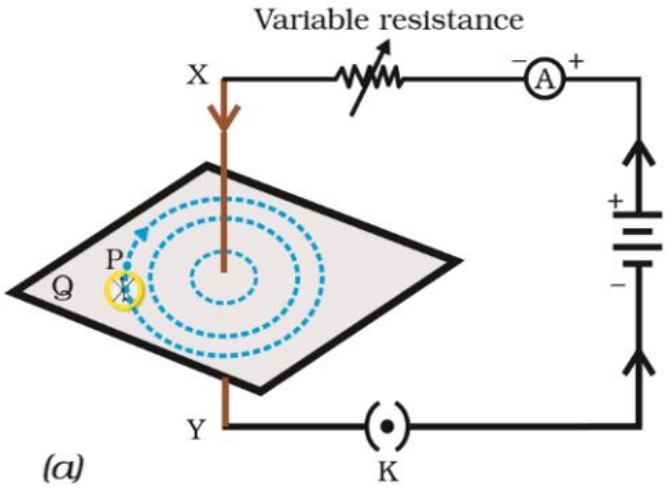
Ans:

Aim: To sketch the pattern of magnetic field lines due to current flowing through a straight conductor.

Materials Required: Battery (12 V), rheostat, an ammeter (0—5 A), plug key, long thick straight copper wire and cardboard

Procedure:

1. Insert the thick wire through the centre, normal to the plane of a rectangular cardboard. Take care that the cardboard is fixed and does not slide up or down.
2. Connect the copper wire vertically between the points X and Y as shown in Fig. (a) in series with the battery and a plug key.



3. Sprinkle some iron filings uniformly on the cardboard.
4. Keep the variable of the rheostat at a fixed position and note the current through the ammeter.
5. Close the key so that current flows through the wire. Ensure that the copper wire placed between the points X and Y remains vertically straight.
6. Gently tap the cardboard a few times. Observe the pattern of the iron filings.

Observation: We observe a pattern of concentric circles around the copper wire which represents magnetic field lines.

Conclusion: It is concluded that a magnetic field is produced around a current carrying conductor. The direction of the magnetic field gets reversed when the direction of the current is reversed.

4. Describe with the help of a diagram an activity to show that a current carrying conductor experiences a force when placed in a magnetic field.

Ans: **Aim:** To show that force is exerted on a current-carrying conductor placed in a strong magnetic field.

Materials Required: A conducting rod AB, connecting wires, horse-shoe magnet, battery, switch and clamp stand.

Procedure:

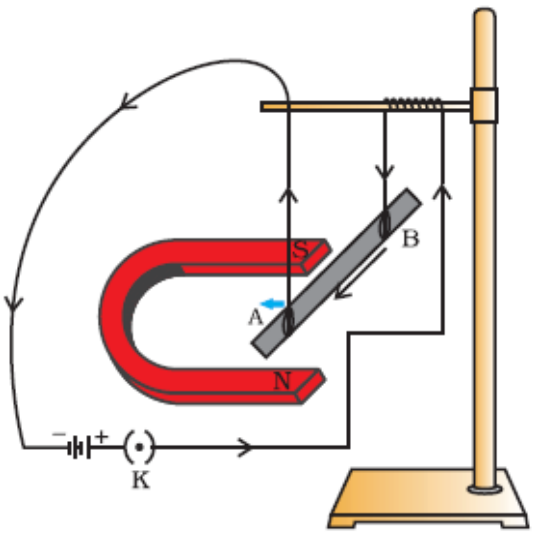
1. Connect the conducting rod AB to the battery and key.
2. Place a strong horse-shoe magnet in such a way that the rod AB lies between the poles with magnetic field directed upwards, i.e. N -pole is vertically below and S -pole is vertically above the rod.
3. Pass a current through the aluminum rod from end B to end A and observe the displacement of the rod.
4. Reverse the direction of the current and observe the change in displacement.

Observation:

1. When the current is passed through the rod, it gets displaced to the left.
2. Reversing the direction of the current causes the rod to get displaced to the right.

Conclusions:

1. A current-carrying conductor placed in a magnetic field experiences a force, causing it to be displaced.
2. The direction of the force depends on the direction of the current and the magnetic field.
3. This phenomenon is explained by Fleming's left-hand rule, which states that if the first finger points in the direction of the magnetic field and the second finger in the direction of current, then the thumb will point in the direction of the force.
4. The experiment demonstrates the magnetic force on a current-carrying conductor, which is the principle behind the working of electric motors.



QUESTION NO.17(B)

1. Explain the experimental procedure to investigate the conditions under which iron rusts.

(Or)

Suggest an activity to prove that the presence of air and water are essential for corrosion

Ans: **Aim:**To prove that the presence of air and water is essential for corrosion or for rusting of iron articles.

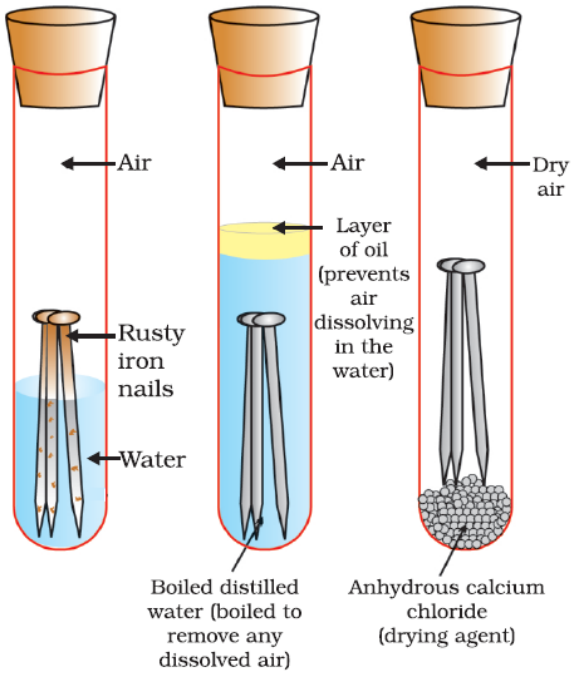
Apparatus: 3 boiled test tubes, 3 corks, boiled distilled water, anhydrous calcium chloride, clean iron nails.

Procedure:

1. Take three test tubes and place clean iron nails in each of them.
2. Label these test tubes A, B and C. Pour some water into test tube A and cork it.
3. Pour boiled distilled water into test tube B, add about 1 ml of oil and cork it. The oil will float on water and prevent the air from dissolving in the water.
4. Put some anhydrous calcium chloride in test tube C and cork it. Anhydrous calcium chloride will absorb the moisture.
5. Leave these test tubes for a few days and then observe.
6. We will observe that iron nails rust in test tube A, but they do not rust in test tubes B and C.

Observation:

1. In test tube A, the nails are exposed to air and water. Hence, the nails rusted.
2. In test tube B, the nails are exposed only to water, but not to air, because the oil float on water and prevents the air from dissolving in the water. Hence, the nails are not rusted.
3. In test tube C, the nails are exposed to dry air, because anhydrous calcium chloride will absorb the moisture, if any, from the air. Hence, the nails are not rusted.



Conclusion:

From the above experiment, we can prove that air and water are essential for corrosion.

2. How do metals react with solutions of other metal salts? Describe an activity

Ans: **Aim:**To know the reaction of metal with salt.

Materials Required: Copper wire, iron nail, iron Sulphate solution, copper sulphate solution, two test tubes, test tube stand, threads.

Procedure:

- ❖ Take a clean wire of copper and an iron nail.
- ❖ Put the copper wire in a solution of iron sulphate and the iron nail in a solution of copper sulphate taken in test tubes.
- ❖ Record your observations after 20 minutes.

Observations

(i) Reaction occurs in the test tube containing iron nail dipped in a copper sulphate solution.

(ii) The copper sulphate solution fades the light colour due to the formation of iron (II) sulphate appears.

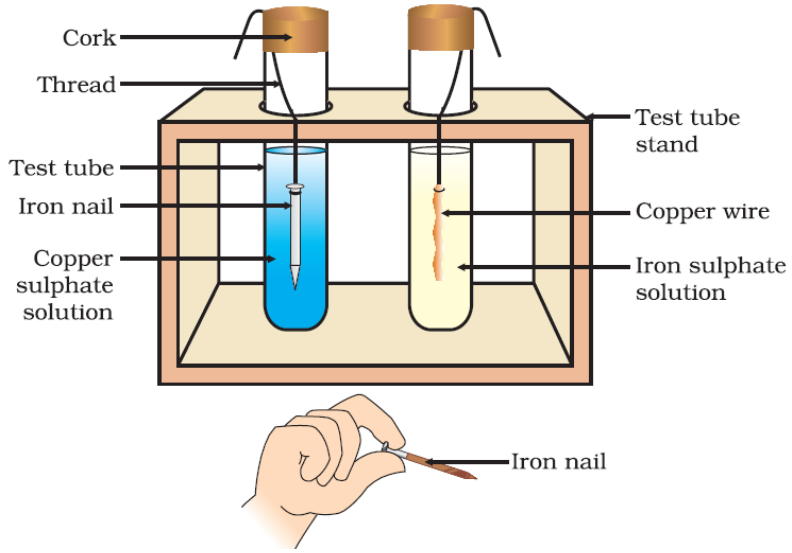
(iii) At the same time, a brown deposit of copper takes place on iron nails.

(iv) Thus, the following reaction takes place:

$$Fe\ (s) + CuSO_4\ (aq) \rightarrow FeSO_4\ (aq) + Cu\ (s)$$

Conclusion:

- ❖ Iron is more reactive than copper and displace from copper sulphate solution.
- ❖ A more reactive metal displaces a less reactive metal from its salt in the solution. This is called displacement reaction.



3. Describe an activity to show how metals react with water (Action of steam on a metal)

Ans: **Aim:** To observe the reaction of a metal with steam and identify the products formed.

Materials Required: Metal sample (e.g., iron), Bunsen burner, Glass-wool soaked in water, Test tube, Cork, Delivery tube, Stand, Water, Beaker, Test tube (for collecting gas)

Procedure:

a) Take a small piece of the metal sample (e.g., iron) and place it in a test tube.

b) Soak some glass-wool in water and place it at the bottom of the same test tube.

c) Attach a cork to the mouth of the test tube and insert a delivery tube through the cork. Ensure the delivery tube is connected securely and the other end of the tube is placed in a beaker filled with water.

d) Set up the test tube on a stand, ensuring the metal sample is above the soaked glass-wool.

e) Heat the glass-wool soaked in water using a Bunsen burner. The heat causes the water to evaporate, producing steam.

f) As steam is generated, it will pass over the metal sample. Observe the reaction of the metal with steam.

g) Continue heating until the reaction is observed. The metal reacts with the steam to form a metal oxide, and hydrogen gas is released.

h) The hydrogen gas produced during the reaction will travel through the delivery tube and get collected in the inverted test tube placed in the beaker filled with water.

Observation: Observe the formation of a metal oxide and the collection of hydrogen gas.

Conclusion: The reaction of the metal with steam can be represented as:

- Metal+Steam→Metal Oxide+Hydrogen Gas
- For example, if iron is used: $3Fe+4H_2O \rightarrow Fe_3O_4+4H_2$